CITY OF HANSEN (PWS 5420027)
SOURCE WATER ASSESSMENT FINAL REPORT

July 16, 2001

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for the City of Hansen, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The City of Hansen (PWS 5420027) drinking water system consists of three ground water sources: Well #1, Well #2, and Well #3. A check of the Idaho Drinking Water Information Management System (DWIMS) revealed past drinking water quality information for the three wells. From July 1999 to January 2001 total coliform bacteria were detected twice at two different points in the distribution system. In February 1997, barium was detected in Well #1 at a concentration of 0.06 milligrams per liter (mg/l). The Maximum Contaminant Level (MCL) for barium is 2.0 mg/l. In September 2000, arsenic was detected in Well #1 at a concentration of 0.005 mg/l. The MCL for arsenic is 0.05 mg/l. The United States Environmental Protection Agency (EPA) may lower the MCL for arsenic in the near future. Both arsenic and barium are inorganic compounds (IOCs), and are likely to be naturally occurring in the formations in which the wells were developed. From September 1993 to September 2000, nitrate levels in Well #1 ranged from 1.56 mg/l to 2.77 mg/l. The highest concentration of nitrates detected in Well #1 is just over 25% the MCL for nitrate, 10 mg/l. No volatile organic compounds (VOCs), synthetic organic compounds (SOCs), or microbial contaminant detections were recorded for Well #1.

A Sanitary Survey conducted in 2000 recommended that the City of Hansen install a vent tube for Well #1 in order to meet current State Requirements. In terms of total susceptibility, Well #1 rated moderate for IOCs, VOCs, SOCs, and microbial contaminants. The agricultural land use, high county farm chemical use, the presence of an organics priority area for pesticides, and the presence of multiple potential sources of contamination in the delineated source water assessment area contributed to the overall ratings for Well #1.

The water sample location for Well #2 and Well #3 includes both wells and the storage reservoir. Consequently, any contaminant detections in samples collected from this location are attributed to both wells and the reservoir in DWIMS. In February 1997, barium was detected at a concentration of 0.044 mg/l, well below the MCL. In September 2000, total trihalomethanes, a VOC, were detected at the Well #2 and Well #3 sample location at a concentration of 5.6 micrograms per liter (µg/l). Bromoform and chlordibromomethane, two components of total trihalomethanes, were detected at concentrations of 1.8 µg/l and 3.8 µg/l, respectively. The MCL for total trihalomethanes is 100 µg/l. The City of Hansen treats its drinking water with chlorine prior to distribution. Trihalomethanes are commonly detected in water treated with chlorine. Consequently, the detection of trihalomethanes in the treated water is not considered source water contamination. From September 1993 to September 2000, nitrate levels in Well #2 and Well #3 ranged from 1.57 mg/l to 2.9 mg/l. The highest concentration of nitrates detected in Well #2 and Well #3 is nearly 30% of the MCL for nitrate. No synthetic organic compounds (SOCs) or microbial contaminant detections were recorded for Well #2 or Well #3.

In terms of total susceptibility, Well #2 and Well #3 rated moderate for IOCs, VOCs, SOCs, and microbial contaminants. The moderate ratings are due mainly to agricultural land use, high county farm chemical use, and the presence of an organics priority area for pesticides and multiple potential contaminant sources in the delineated source water assessment areas for Well #2 and Well #3.

This assessment should be used as a basis for re-evaluating existing protection efforts described in the City of Hansen's Drinking Water/Wellhead Protection Plan. The plan was approved in June 1999 and is considered a "State Certified Plan" until June 2002. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to observe the management practices of the Drinking Water/Wellhead Protection Plan.

For the City of Hansen, source water protection activities should first focus on correcting, if corrections have not been completed, the deficiencies outlined in the Sanitary Survey. The City of Hansen should also focus on implementing the provisions set forth in the Drinking Water/Wellhead Protection Plan. If arsenic, barium, and nitrate detections recorded in the wells increase, the City of Hansen should investigate various systems like ion exchange, reverse osmosis, or activated alumina that could be used to treat these problems. Disinfection practices should be optimized to minimize the formation of trihalomethanes in the treated drinking water. Any spills from the identified potential contaminant sources in the source water assessment area, or the Twin Falls Main Canal should be monitored carefully. Most of the source water protection designated areas are outside the direct jurisdiction of the City of Hansen. Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil and Water Conservation District, and the Natural Resources Conservation Service. The City of Hansen demonstrated a strong commitment to protecting their drinking water by developing and implementing an approved Drinking Water/Wellhead Protection Plan in June 1999.

SOURCE WATER ASSESSMENT FOR CITY OF HANSEN, TWIN FALLS COUNTY, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Hansen wells are community wells that serve approximately 1078 people and approximately 373 connections. The wells are located in Twin Falls County, to the east of Twin Falls and to the south of the Snake River (Figure 1). The public drinking water system for City of Hansen is currently comprised of three wells: Well #1, Well #2, and Well #3.

Arsenic, barium, and nitrates represent the main water chemistry problems recorded in the public water system. The IOC nitrate was detected from September 1993 to September 2000 at levels no more than 30% of the MCL in wells #1, #2, and #3. Arsenic was detected well below the MCL in Well #1 in September 2000. Barium was detected well below the MCL in all three wells in February 1997. No VOCs, SOCs, or microbial contaminants were recorded in the source water of any of the wells.

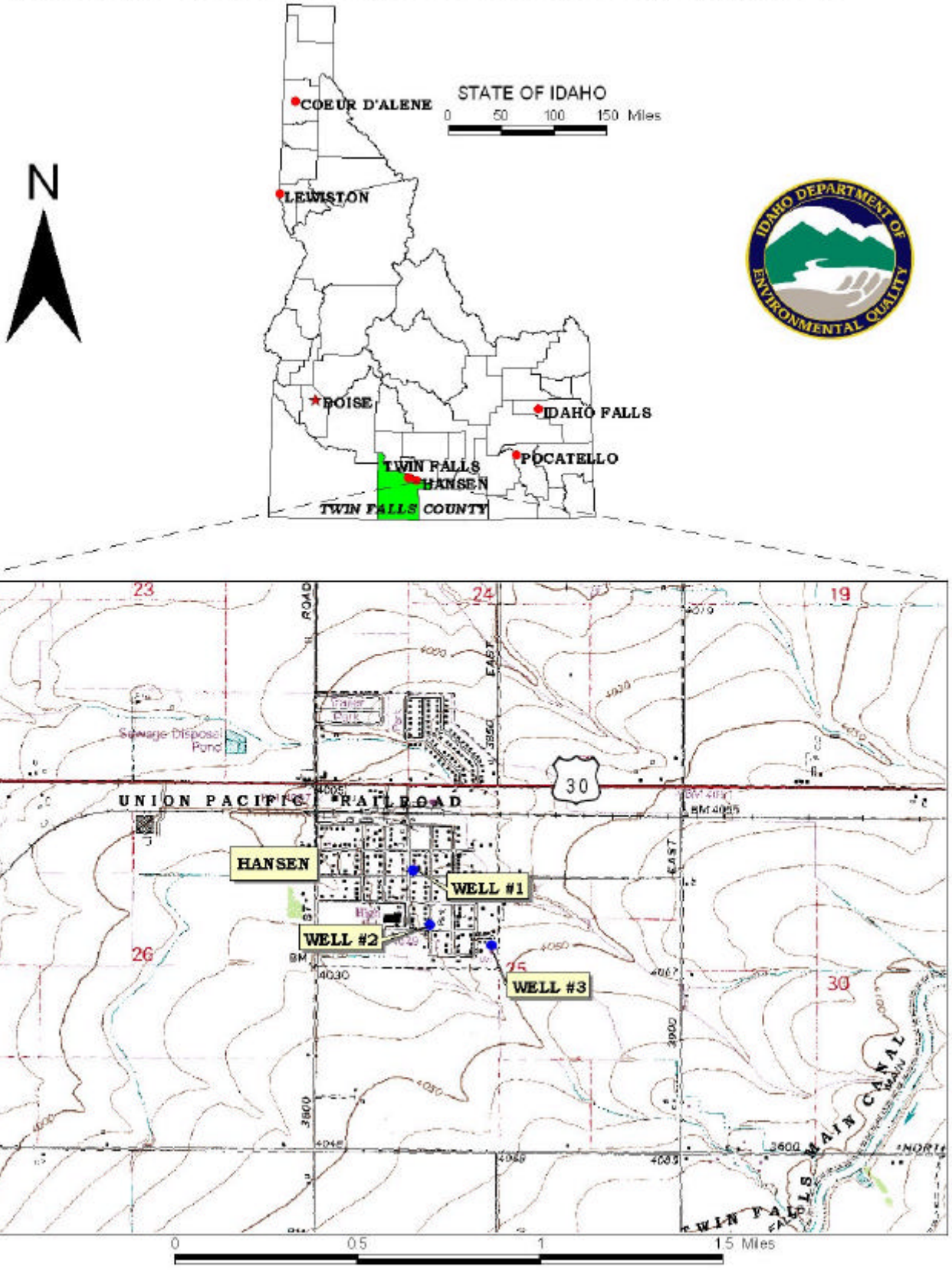
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Snake River Plain Aquifer in the vicinity of the City of Hansen. The computer model used site specific data, assimilated by DEQ from a variety of sources including City of Hansen well logs, other local area well logs, and hydrogeologic reports summarized below.

Wells #1, #2, and #3 extract water from the Banbury Basalt which overlies the Idavada Volcanics. The Idavada Volcanics unit consists of welded ash and tuff, rhyolite, and some basalt flows. The Idavada Volcanics are up to 2,000 feet thick in the Hansen area and contain fractures and columnar joints, allowing some mixing of the geothermal groundwater in the Idavada Volcanics with groundwater in the Banbury Basalt (Lewis and Young, 1989). The Banbury Basalt is of variable thickness and is the primary non-geothermal aquifer in the Hansen area (Moffat and Jones, 1984). Basalt flows fracture at the surface as they cool. The fractures occur in the horizontal direction throughout the flow. The Banbury Basalt is fractured and contains thin sedimentary interbeds. These fractures and sedimentary interbeds comprise the water producing zones in the Banbury Basalt (Cosgrove, et al., 1997). Regional ground water flow is to the north and northwest, but may vary with proximity to major creeks and the Snake River (Lewis and Young, 1989).

The delineated source water assessment areas for the City of Hansen wells can best be described as a corridor approximately 0.5 mile wide and 1.8 miles long extending to the southeast from City of Hansen (Figure 2). The actual data used by DEQ in determining the source water assessment delineation areas are available upon request.

FIGURE 1. Geographic Location of the City of Hansen



Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

The dominant land use outside the City of Hansen area is irrigated agriculture. Land use within the immediate area of the wellheads consists of residential property, commercial and light industrial, and agricultural.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination. These involve educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

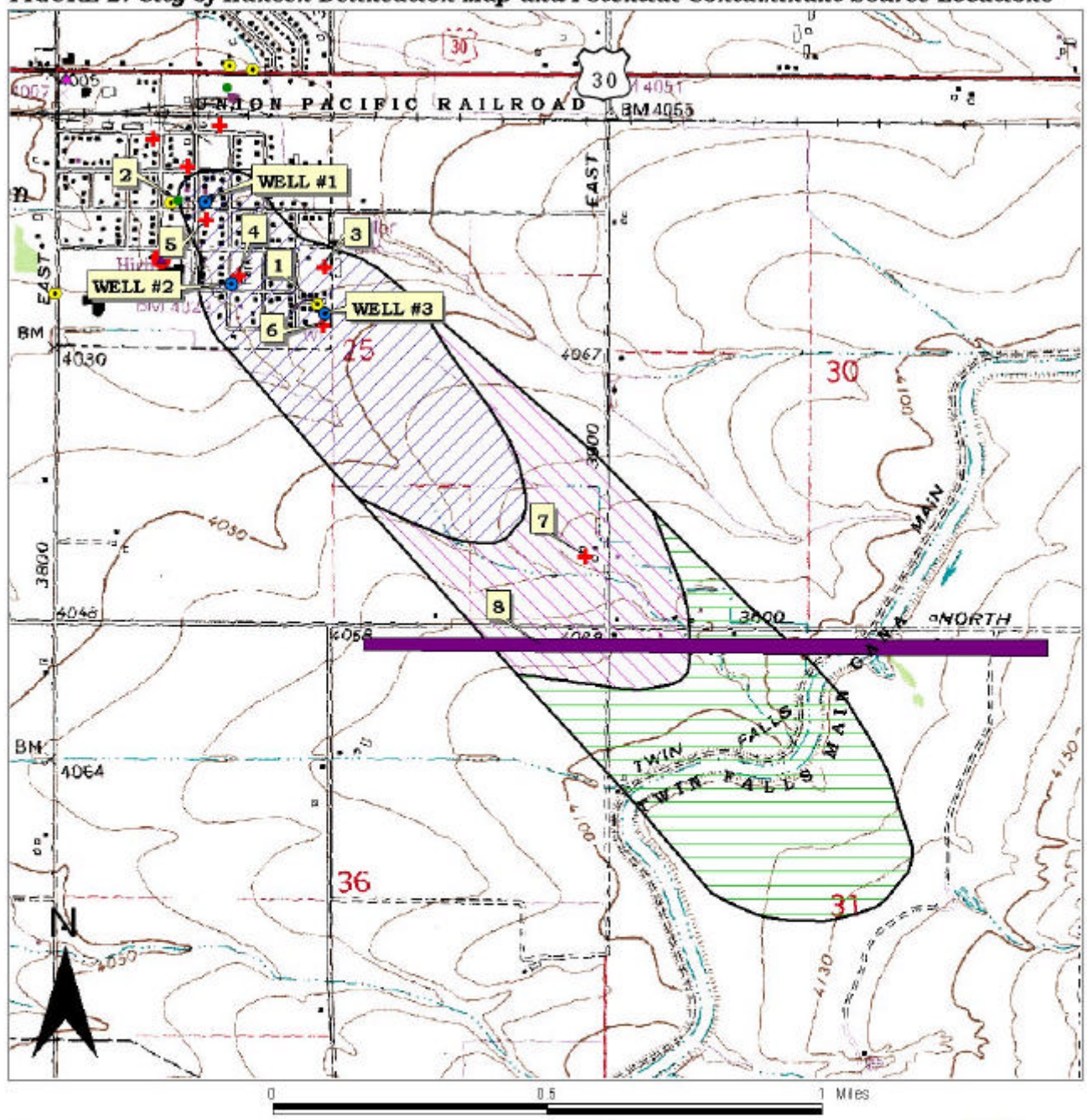
A contaminant inventory of the study area was conducted during March 2000. This process involved identifying and documenting potential contaminant sources within City of Hansen Source Water Assessment area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The City of Hansen conducted an enhanced inventory to identify additional potential sources of contamination in the delineated source water assessment area. The delineated source water area for the wells contains nine potential contaminant sources, six of them in the 3-year time of travel (Table 1). Figure 2 shows the locations of these various potential contaminant sites relative to the wellheads.

Table 1. City of Hansen Well #3, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
1	Fire Damage Restoration	0-3	Database Search	IOC, VOC, SOC
2	City of Hansen	0-3	Database Search	IOC, VOC, SOC
3	Underground Storage Tank, Farm Chemicals	0-3	Enhanced Inventory	IOC, VOC, SOC
4	Lawn Care Chemicals	0-3	Enhanced Inventory	IOC, VOC, SOC
5	Underground Storage Tank, removed; Sump	0-3	Enhanced Inventory	VOC, SOC
6	Underground Storage Tank	0-3	Enhanced Inventory	VOC, SOC
7	Feedlot, 30+ beef cattle	3-6	Enhanced Inventory	IOC, Microbes
8	Chevron Pipeline	3-6	Enhanced Inventory	VOC, SOC
	Twin Falls Main Canal	6-10	GIS Map	IOC, VOC, SOC, Microbes

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

FIGURE 2. City of Hansen Delineation Map and Potential Contaminant Source Locations



IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

PWS# 5420027
WELL #1, #2, #3

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

Hydrologic sensitivity was moderate for all three wells (Table 2). This reflects the nature of the soils being in the moderately-drained to poorly-drained class, the vadose zone (zone from land surface to the water table) being made predominantly of fractured basalt with sedimentary interbeds, and the first ground water being located within 300 feet of ground surface. The wells contained at least 50 cumulative feet of low permeability units that could retard downward movement of contaminants.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. The City of Hansen drinking water system consists of three wells that extract ground water for residential, commercial, and industrial uses. The well system construction scores were moderate for Well #1 and #2 and low for Well #3 (Table 2). A sanitary survey for the system was completed in 2000 to determine if the wells were in compliance with wellhead and surface seal standards. Each of the wells has a properly maintained wellhead seal, however, a down-turned vent pipe is needed for Well #1. None of the wells are in the 100-year floodplain.

Well logs were available for all three wells. The highest water production zone for Well #1 and #2 is within 100 feet below static water level. The highest water producing zone for Well #3 is at least 100 feet below static water level, providing protection against infiltration downward migrating contaminants. The casing was extended into low permeability units in all three wells. Though the wells may have been in compliance with standards when they drilled, current PWS well construction standards are more stringent. The casing thickness for all three wells do not meet IDWR standards of 0.375 inches for 12 to 14-inch diameter casing as listed in the Recommended Standards for Water Works (1997).

The IDWR Well Construction Standards Rules (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the Recommended Standards for Water Works (1997) during construction. Under current standards, all PWS wells are required to have a 50 foot buffer around the wellhead.

Potential Contaminant Sources and Land Use

All three wells rated high for IOCs (i.e. nitrates), VOCs (i.e. petroleum products), and SOCs (i.e. pesticides). Agricultural land use, the presence of an organics priority area (pesticides), and the presence of multiple potential contaminant sources within the delineated source water assessment area contributed to the rankings. All three wells rated low for microbial contaminants (Table 2). These ratings are due to the fact that potential microbial contaminant sources in the delineated source water area are less numerous than for IOCs, VOCs, and SOCs. Table 1 lists the potential contaminant sources in the delineated source water area for each well. The locations of potential contaminant sources for each well are shown on Figure 2.

Final Susceptibility Ranking

A detection above a drinking water standard MCL or a detection of a VOC or SOC at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and a large percentage of agricultural land contribute greatly to the overall ranking. The presence of an organics priority area also contributes to the overall ranking. In terms of total susceptibility, all three wells rated moderate for IOC, VOC, SOC, and microbial contamination (Table 2). The moderate rating reflects the presence of an organics priority area and the multiple potential contaminant sources in the delineated source water assessment areas for all three wells.

Table 2. Summary of the City of Hansen Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	H	H	H	L	M	M	M	M	M
Well #2	M	H	H	H	L	M	M	M	M	M
Well #3	M	H	H	H	L	L	M	M	M	M

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

Arsenic, barium, and nitrates represent the main water chemistry recorded in the public water system. The IOC nitrate was detected from September 1993 to September 2000 at levels no more than 30% of the MCL in wells #1, #2, and #3. Arsenic was detected well below the MCL in Well #1 in September 2000. Barium was detected well below the MCL in all three wells in February 1997. Total trihalomethanes were detected in Well #2 and Well #3 in September 2000 far below the MCL. Trihalomethanes are a common byproduct of chlorine treatment and are not considered a VOC contaminant. No VOCs, SOCs, or microbial contaminants were recorded in the source water of any of the wells.

An organics priority area (for the pesticide Atrazine) crosses the delineated source water areas of all three wells. Countywide farm chemical use is considered high, and the delineated source water area for the wells is surrounded by a significant amount of irrigated agricultural land. Additionally, multiple potential sources of contamination exist in the delineated source water areas for the wells.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For the

City of Hansen, source water protection activities should focus on implementation of practices aimed at protecting the area nearest the wells and addressing any deficiencies listed in the 2000 Sanitary Survey. The City of Hansen should also focus on implementing the provisions set forth in the Drinking Water/Wellhead Protection Plan which was approved by DEQ in June 1999. The City of Hansen should also be diligent about local businesses that are regulated by the various environmental regulations (RCRA, CERCLA, SARA) or those with potential IOC, VOC, SOC, or microbial contaminants. Though water quality is generally good for the City of Hansen, the highly fractured nature of the basalt aquifer could lead to cross-contamination from shallower fractures to deeper fractures depending on well construction. Any spills from the multiple potential contaminant sources in the delineated capture zones should be monitored carefully. Any surface releases should be monitored to prevent contaminants from infiltrating to the ground water producing zones.

Disinfection practices should be optimized to minimize the formation of trihalomethanes in the water extracted from Well #2 and Well #3. If arsenic, barium, and nitrate concentrations in the wells increase, the City of Hansen should investigate various systems like ion exchange, reverse osmosis, or activated alumina that could be used to treat these problems. Most of the source water protection designated areas are outside the direct jurisdiction of the City of Hansen. Partnerships with state and local agencies and industry groups should be established and are critical to success. Continued vigilance in keeping the wells protected from surface flooding can also keep the potential for contamination reduced. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil and Water Conservation District, and the Natural Resources Conservation Service.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Twin Falls Regional DEQ Office (208) 736-2190

State DEQ Office (208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1 – 800 – 962 – 3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as "Superfund" is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

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Attachment A

City of Hansen
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report Public Water System Name : HANSEN CITY OF Well# : WELL #1
Public Water System Number 5420027 4/30/01 10:47:45 AM

1. System Construction		SCORE				
Drill Date		2/6/58				
Driller Log Available		YES				
Sanitary Survey (if yes, indicate date of last survey)		YES	2000			
Well meets IDWR construction standards		NO	1			
Wellhead and surface seal maintained		NO	1			
Casing and annular seal extend to low permeability unit		YES	0			
Highest production 100 feet below static water level		YES	0			
Well located outside the 100 year flood plain		YES	0			
	Total System Construction Score		2			
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained		NO	2			
Vadose zone composed of gravel, fractured rock or unknown		YES	1			
Depth to first water > 300 feet		NO	1			
Aquitard present with > 50 feet cumulative thickness		YES	0			
	Total Hydrologic Score		4			
3. Potential Contaminant / Land Use - ZONE 1A			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND		2	2	2	2
Farm chemical use high		YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A		NO	NO	NO	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)		YES	4	6	6	0
(Score = # Sources X 2) 8 Points Maximum			8	8	8	0
Sources of Class II or III leacheable contaminants or		YES	3	4	4	
4 Points Maximum			3	4	4	
Zone 1B contains or intercepts a Group 1 Area		YES	0	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land		4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B		15	16	18	4
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present		YES	2	2	2	
Sources of Class II or III leacheable contaminants or		YES	0	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land		2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II		4	5	5	0
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present		YES	1	1	1	
Sources of Class II or III leacheable contaminants or		YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of		YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score			26	26	30	6
4. Final Susceptibility Source Score			11	11	12	8
5. Final Well Ranking			Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report Public Water System Name : HANSEN CITY OF Well# : WELL #2
Public Water System Number 5420027 4/30/01 10:47:45 AM

1. System Construction		SCORE
Drill Date	2/24/74	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	2000
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		2

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	YES	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	6	6	0
(Score = # Sources X 2) 8 Points Maximum		8	8	8	0
Sources of Class II or III leacheable contaminants or	YES	3	4	4	
4 Points Maximum		3	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		15	16	18	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	0	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		4	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		26	26	30	6
4. Final Susceptibility Source Score		11	11	12	8
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report Public Water System Name : HANSEN CITY OF Well# : WELL #3
Public Water System Number 5420027 4/30/01 10:47:45 AM

1. System Construction		SCORE				
Drill Date		10/29/80				
Driller Log Available		YES				
Sanitary Survey (if yes, indicate date of last survey)		YES	2000			
Well meets IDWR construction standards		NO	1			
Wellhead and surface seal maintained		YES	0			
Casing and annular seal extend to low permeability unit		YES	0			
Highest production 100 feet below static water level		YES	0			
Well located outside the 100 year flood plain		YES	0			
	Total System Construction Score		1			
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained		NO	2			
Vadose zone composed of gravel, fractured rock or unknown		YES	1			
Depth to first water > 300 feet		NO	1			
Aquitard present with > 50 feet cumulative thickness		YES	0			
	Total Hydrologic Score		4			
3. Potential Contaminant / Land Use - ZONE 1A			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND		2	2	2	2
Farm chemical use high		YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A		YES	NO	YES	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)		YES	4	6	6	0
(Score = # Sources X 2) 8 Points Maximum			8	8	8	0
Sources of Class II or III leacheable contaminants or		YES	3	4	4	
4 Points Maximum			3	4	4	
Zone 1B contains or intercepts a Group 1 Area		YES	0	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land		4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B		15	16	18	4
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present		YES	2	2	2	
Sources of Class II or III leacheable contaminants or		YES	0	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land		2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II		4	5	5	0
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present		YES	1	1	1	
Sources of Class II or III leacheable contaminants or		YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of		YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score			26	26	30	6
4. Final Susceptibility Source Score			10	10	11	7
5. Final Well Ranking			Moderate	Moderate	Moderate	Moderate